Center of Excellence in Advanced Communications Technology

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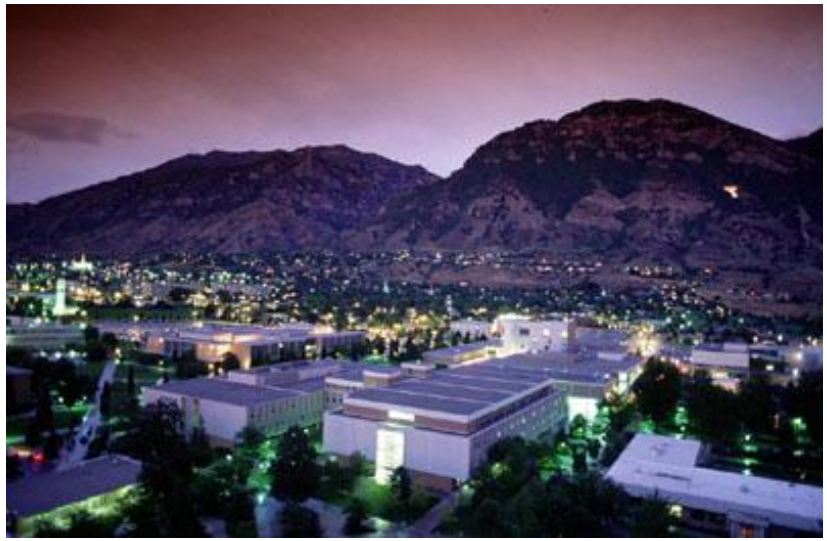


COE Technologies

Summary and Features

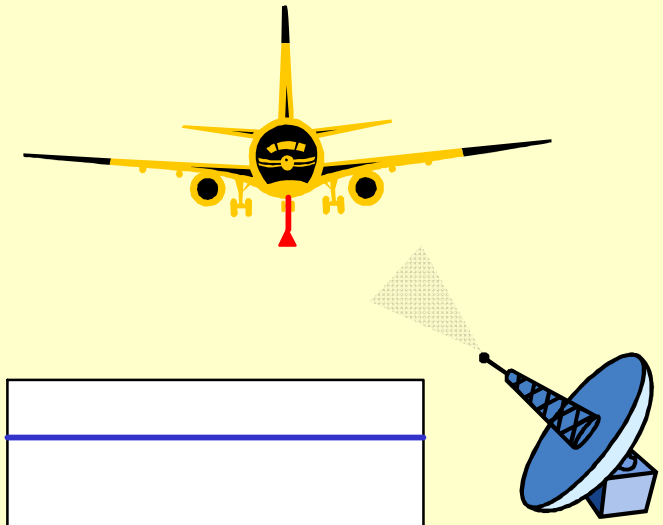
1. **Air-Vehicle Wireless Communications**
   - Reliable communications for maneuvering vehicles
   - Simple, bandwidth efficient
   - Solves articulated DoD need

2. **Sensors for Unmanned Air Vehicles (UAVs)**
   - Imaging and navigation radars
   - Small, lightweight payloads
   - Low-power
   - Suitable for small UAVs

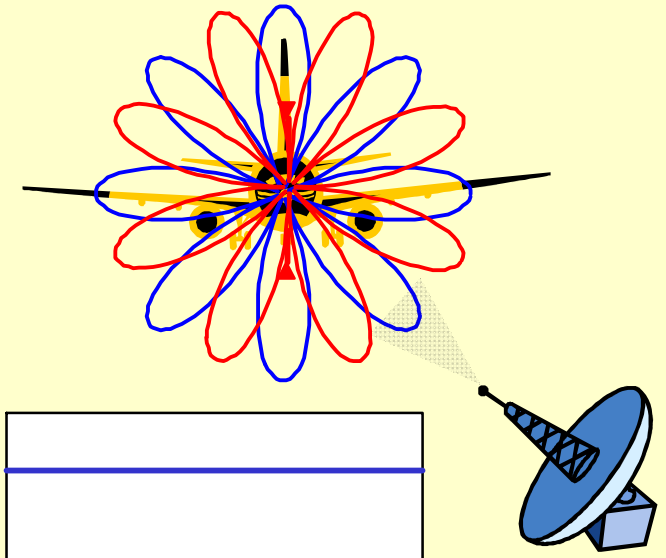
Technology Overview

Air-Vehicle Communications

Air vehicle maneuvering masks aircraft Tx antenna

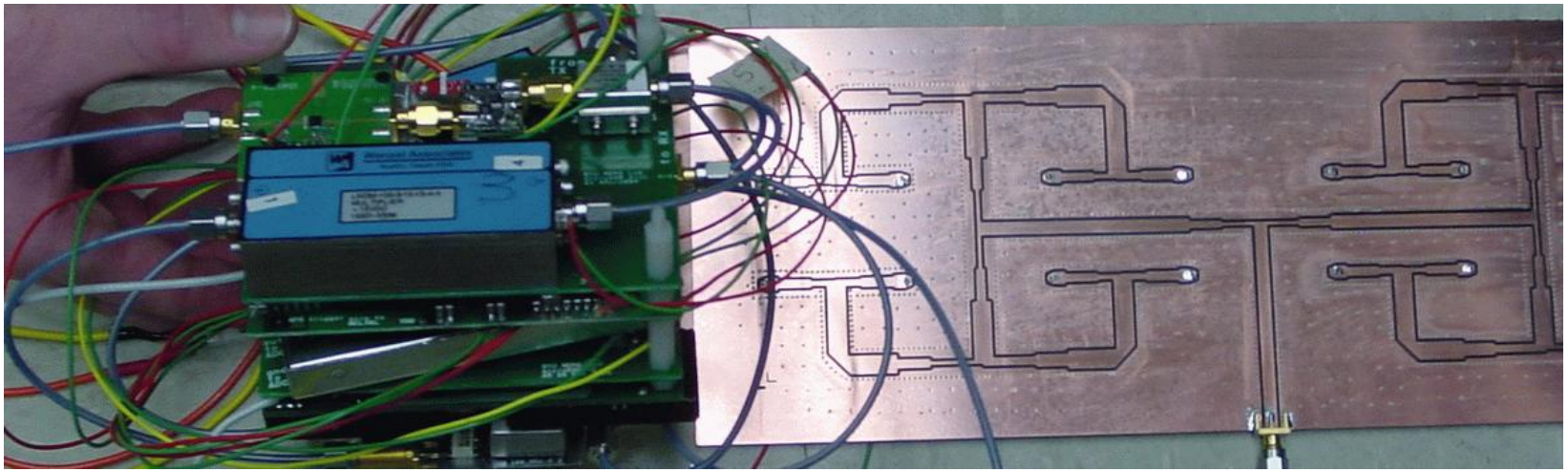


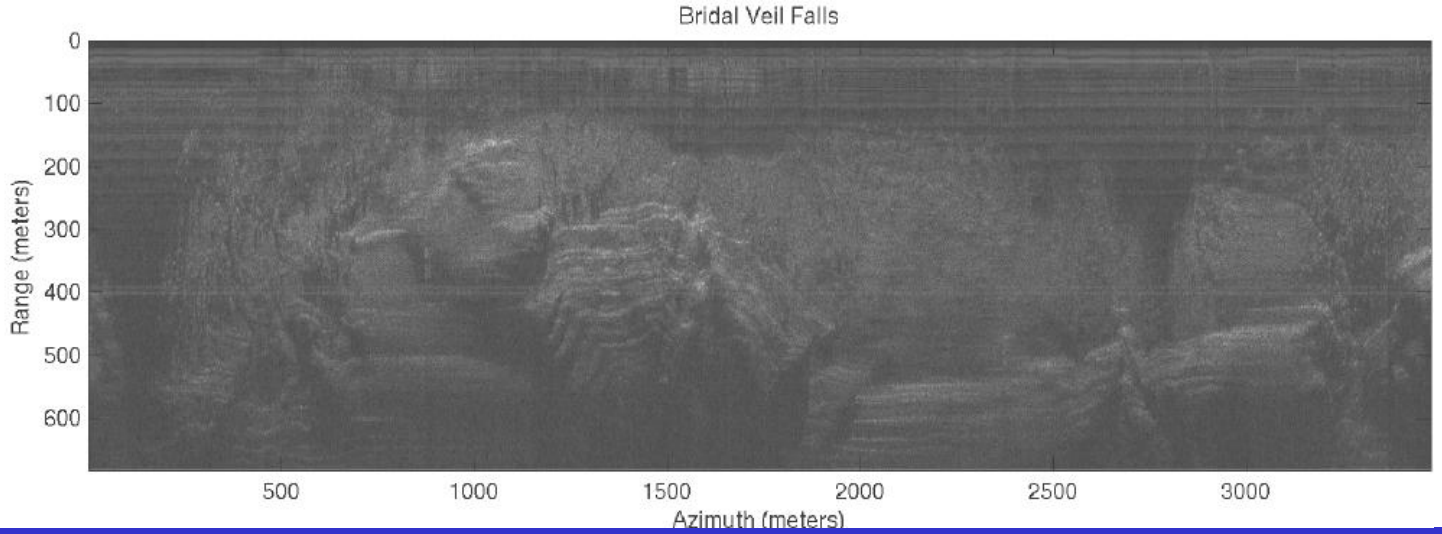
BYU Solution: Receive two transmissions to self-interference



Technology Overview

UAV Sensors





First Year Progress

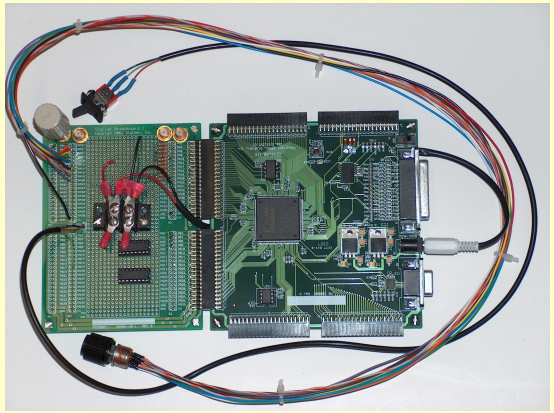
Summary

Examined 14 Market Opportunities

Current focus on 2 core markets

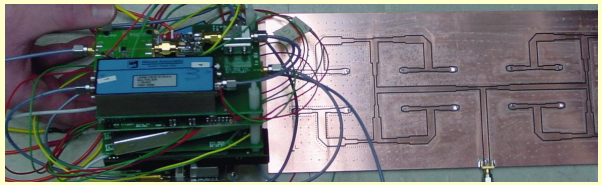
1. Air-Vehicle Communications

- Completed R&D on original system
- Successfully flight-tested prototype
- Invented new architectures
- Secured $1.5 million additional funding



2. Sensors for UAVs

- Formed alliance with COE in UAVs
- Succesfully demonstrated prototype
- Secured $1.12 million additional funding



Product Development

Air-Vehicle Communications

Resulting Directly from Prototype

1. Single-antenna transmitter
2. Single-antenna demodulator
3. Dual-antenna transmitter
4. Dual-antenna demodulator

} Result of new technology development

Resulting Indirectly from Prototype

5. Helicopter transmitter
6. Helicopter receiver
7. UAV transmitter
8. UAV receiver

Product Development

UAV Sensors

Resulting Directly from Prototype

1. Micro-SAR (imaging radar)

Resulting Indirectly from Prototype

2. Position location system
3. Navigation system

Competitive Analysis

Air-Vehicle Communications

Transmission Technology	BYU Scheme	Generic Array	Adaptive Array	Dual Frequency	Time-Redundant
No 2-Way Comm. Required	X	X		X	X
Low Transmitter Complexity	X	X		X	
Error Free Performance	X		X	X	X
No Bandwidth Increase	X	X	X		

Intellectual Property: 1 Patent Application
4 Provisional Patents

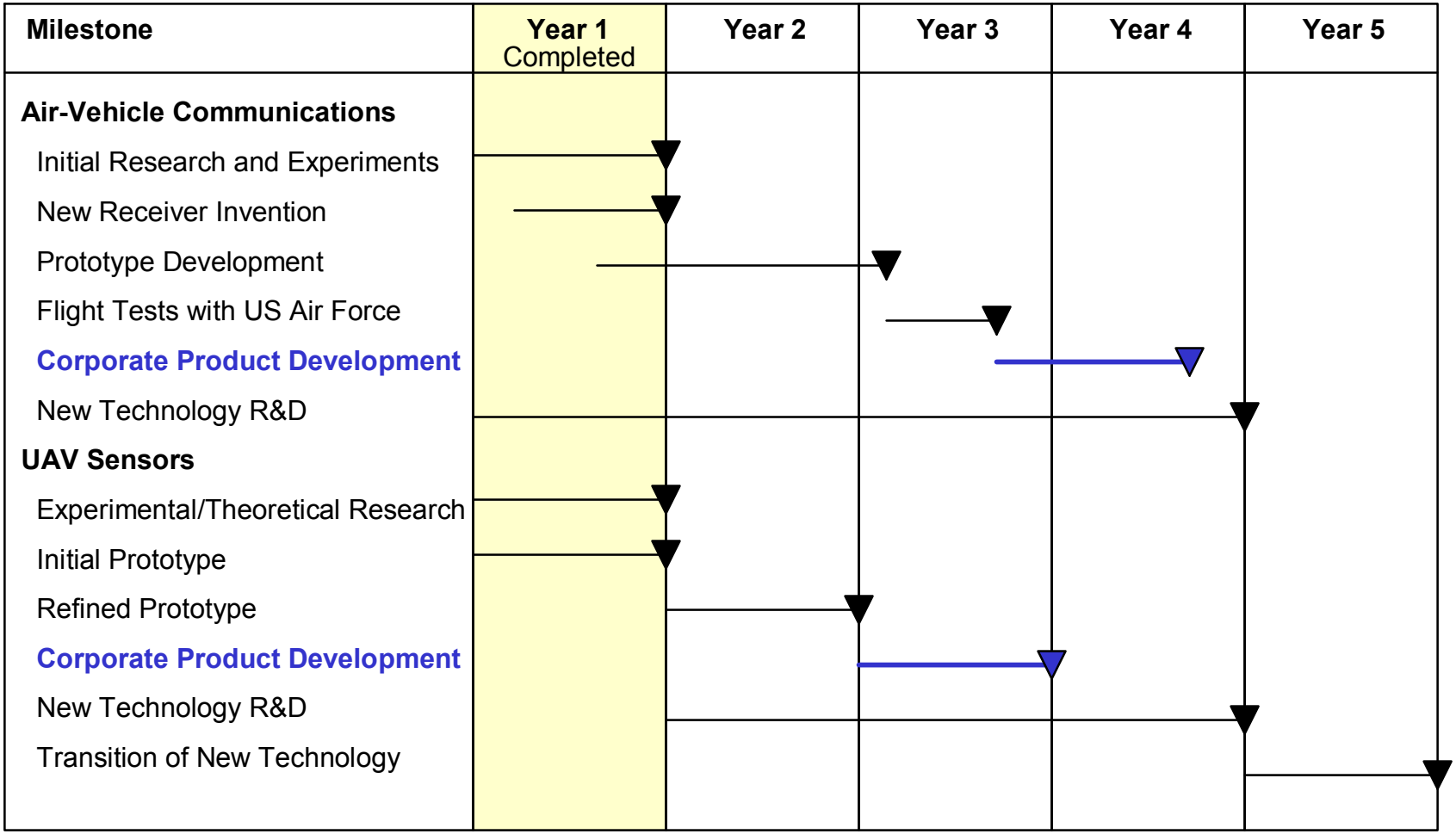
Competitive Analysis

UAV Sensors

Sensor Technology	BYU Scheme	Conventional Radar	Optical Camera	IR Camera
Small & Lightweight	X		X	X
Low Power	X		X	X
Night Operation	X	X		X
All-weather Operation	X	X		
High Contrast	X	X		
High Resolution	x	X	X	X

Intellectual Property: 1 Provisional Patent

Schedule


Milestone
Year 1
Completed
Year 2
Year 3
Year 4
Year 5
Air-Vehicle Communications
Initial Research and Experiments
New Receiver Invention
Prototype Development
Flight Tests with US Air Force
Corporate Product Development
New Technology R&D
UAV Sensors
Experimental/Theoretical Research
Initial Prototype
Refined Prototype
Corporate Product Development
New Technology R&D
Transition of New Technology

Market Summary

Long Term Yearly Revenue

Product	Unit Price	Total # Units	Total Market ($M)	BYU # Units	BYU Market ($M)
Aircraft Tx	$5,000	971	4.85	971	4.85
Missile Tx	$2,000	5000	10.00	500	1.00
Receivers	$15,000	400	6.00	150	2.25
Helicopter	$50,000	1000	50.00	100	5.00
UAV	$380 M	%40	152.00	15%	22.80
Revenue			**222.85**		**35.90**

Assume capture all of tactical aircraft market

Market specified in Government spending for UAVs

Market Summary

Yearly Projections

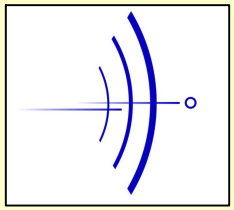
Product	2008	2009	2010	2011	2012
Aircraft Transmitters	$4,855,000	$4,855,000	$4,855,000	$4,855,000	$4,855,000
Missile Transmitters	$400,000	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Aircraft Receivers	$750,000	$1,500,000	$2,250,000	$2,250,000	$2,250,000
Helicopter Communications		$500,000	$2,500,000	$5,000,000	$5,000,000
UAV Communications		$2,500,000	$12,500,000	$12,500,000	$12,500,000
UAV Sensors	$2,250,000	$3,250,000	$4,500,000	$7,000,000	$8,250,000
Total Revenue	**$8,255,000**	**$13,605,000**	**$27,605,000**	**$32,605,000**	**$33,855,000**

Center Management

Key Personnel

Director: Michael A. Jensen

- Founder in 2 companies
- Over $8.3 million research
- Over 140 publications



Co-Director: A. Lee Swindlehurst

- Key technical consultant for 5 years
- Over $9 million research
- Over 180 publications

Co-Director: Michael D. Rice

- Key technical consultant for 4 years
- Over $4 million research
- Over 90 publications

Center Funding

Support

Current Financial Support	Amount	Dates
National Science Foundation	$354,000	9/03-8/06
Edwards Air Force Base	$100,000	1/05-12/05
SDRC/DARPA	$165,000	1/04-12/05
National Science Foundation	$1,125,000	9/04-8/09
CTEIP/Air Force	$893,000	3/05-2/07
Army Research Office (MURI)	$627,000 (of 5.2M)	5/04-4/09
Total	**$3,264,000**	

2005-2006 Support	
External	$1,115,000
COE Request	$128,203
Match	8.7:1